

Session 2G

Probabilistic Risk Assessment

Working Group Report

Grand Challenge

- To develop the capability and acceptance to incorporate PRA (and uncertainty analysis) into the design process of nuclear fuel cycle systems to improve economics and safety performance.

What are the benefits?

- Required for licensing of new facilities.
- Cost savings since
 - higher fidelity implies more confidence and hence allows utilization of decreased design margins.
 - allows designing to decrease sensitivity to uncertainties.
- Improved training, procedures and emergency planning via better understanding of accident progression.
- Improved public acceptance via safer designs justifiable to the public.
- Improved decision making via providing more timely responses.

Why is leadership class computing required?

- To simulate using high fidelity, contiguous (coupled) models to predict system responses to a wide range of stimuli.
- To allow coupling of multi-physics phenomena leading to more realistic uncertainty predictions.
- To enable quantification of uncertainties of key system attributes to data and model uncertainties.
- To allow more exhaustive examination of scenarios and outcomes.
- To evaluate the time evolutionary paths of dynamic systems (dynamic PRA versus current PRA to reduce conservatism).
- To enable visualization to reduce complexity, supporting improved decision making and public acceptance.

What is required to make it happen?

- Access to leadership class computing.
- Sustained research support to develop modeling capabilities and obtain supporting data.
- Acceptance by licensing body and engineering practitioners.
- Development of processes to incorporate PRA and uncertainty analysis into the overall design process.
- Modifications of standards and codes.
- A priori consideration of incorporating uncertainty analysis and PRA when developing simulation capabilities.